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"The Impact of Management Science on
Political Decision Making"

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THE IMPACT OF MANAGEMENT SCIENCE ON POLITICAL DECISION MAKING*

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In the past 75 years in the United States and other industrialized countries a large number of managerial and scientific technologies have penetrated organizations, public and private, and been integrated into the routine fabric of institutional activities. McKean's list includes scientific management, financial analysis, consumer's research, market research, operations research, and systems analysis.¹ To these we could add long range planning, research and development, industrial engineering, PPBS, and futuristics. Currently several of these technologies (operations research, systems analysis, and PPBS) are being integrated into the American federal government and into many state and local governments.

For the purposes of this paper no particular distinction will be drawn between these three, and all will be considered OR/MS (for operations research - management science). In common with other managerial technologies, OR/MS has the following attributes: it is rationalistic, in that it assumes that explicit human intelligence can lead to improvement; it is research oriented; it involves esoteric techniques and uncommon cognitive perspectives; it is oriented toward increasing the viability and effectiveness of complex

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organizations in increasingly complex environments; and, it leads to the routine production of new ideas. Further, OR/MS shares with other managerial technologies two organizational attributes: it is usually organized into specialized organizational units and has been accompanied by a parallel process of institutionalization in the academic world.²

Whether known as PPBS, systems analysis, or operations research (each claims the others as either offsprings or siblings), the application of these and related technologies has caused much controversy in federal civilian agencies just as it has in defense and industrial settings. Among others, the professional practitioners of OR/MS engage in vigorous and spirited debate about their performance as a profession. Their writings often contain the most broad, perceptive, and constructive of all criticisms of OR/MS. However as James Schlesinger writes:³

Analysts themselves may be self-doubting, bemused by uncertainties, frighteningly candid, but different tactics have been required of the missionaries who have proselytized in behalf of analysis.

Consequently, Mosher and others find OR/MS oversold⁴, and there is a general reaction against their hyperbolic claims. These practitioners, or analysts, are often equally vigorous in their criticisms of the institutions which employ them and the people and policies they find there. This is, of course, as it should be; for analysts are change-agents and their job is constructive criticism. They are more than ordinary change agents also. They are, in the phrase of Michael Radnor, "change-squared" agents. The consequence of their activity is not only discrete changes but also change in the way change itself occurs in institutional settings. OR/MS analysts and OR/MS are thus doubly threatening. It should be no surprise that the reaction to them is sharp and sometimes confused.

Criticisms of OR/MS can be divided into those which are optimistic and those which are pessimistic in the following sense. Some criticisms seem to have as their underlying assumption that OR/MS will have a significant impact on public policy and organizational decision making. OR/MS recommendations will be implemented and OR/MS analysts will achieve a position of power and influence in important matters of state. Criticisms making or implying this assumption shall be called optimistic. On the other hand, many criticisms seem to assume that OR/MS will have little or no impact. OR/MS recommendations will not be implemented and OR/MS analysts will not achieve positions of power and influence. Criticisms making or implying this assumption shall be called pessimistic. I shall at times restate criticisms of OR/MS. In doing so there is some danger that criticisms will be taken beyond their authors' original intent. The distortion is moderated in my view by the common organizational consequences of the component OR/MS technologies. We shall treat the controversy in the setting of federal civilian agencies and shall proceed with comments on specific criticisms of OR/MS.

THE PESSIMISTIC CRITIQUE, PART I: IT CAN'T BE DONE

When most forthright, the pessimistic critique says that OR/MS is simply impossible. Victor Thompson writes:⁵

I must be blunt: science cannot solve social problems. Suppose, for example, that we ask medicine to solve the problem of race prejudice. As a medical problem the 'solution' might turn out to be some drug. However the social problem would still remain.

The same holds true for the solutions of management scientists, the

"econologists" who have seized the opportunity for power presented by PPBS.

Thompson continues:

The solution of a social problem is properly described with such words as 'compromise', 'consensus', 'majority', 'negotiation', 'bargaining', 'coercion', etc. If the 'solution' cannot be described in such terms, then it is not the solution of a social problem.

Wildavsky reacts to PPBS in an equally abrupt manner: PPBS cannot be done because no one knows how to do it.⁶

These are strong statements. It is obvious recommendations must be implemented before they are 'solutions'. Or is it? A recommendation can be implemented and still not be a solution. We have many cases of that. And a recommendation need not be described in Thompson's vocabulary to be a solution. There has been recently much writing on "incentives".⁷ Too many of these incentives are within the discretion of administration for Thompson's vocabulary to be given unqualified allegiance. But perhaps this all is quibbling with words. Thompson's criticism is less inaccurate than it is trivial.⁸ The statement that no one knows how to do PPBS, is both inaccurate and trivial. PPBS was being done prior to 1965 in the Defense Department and in several large corporations and, in a prototype form, in several federal civilian agencies as well. Whether the PPBS that was or is practiced happens to meet some set of explicit personal criteria is another matter, but Wildavsky does not offer such criteria.

If PPBS or some other form of OR/MS can be done, it can be misdone as well. Wildavsky suggests that benefit-cost analyses can be "fudged" by adding in benefits such as 'recreation' or through the manipulation of the discount rate or through opportunistic aggregation.⁹ In a later paper he castigates economists for adding in aesthetic factors in order to make their analyses come out "right".¹⁰ James Schlesinger notes the criticism of OR/MS in the Defense Department based on military fiascos

like the TFX or the Viet-Nam (or is it 'S.E.A.') War, although he acquits OR/MS of the charges.¹¹ I once forced this very criticism upon a group of civilian agency analysts and their response is appropriate here. They argued that when and if this happened other analysts would step in and let it be known. Professional criticism would in most cases be sufficient control. Professional criticism is also the channel through which Wildavsky was able to learn about the methodological peculiarities which he notes.

OR/MS Criticized for Lack of Political and Social Realism

It is easiest to list some specifics and then list comments. (a) Thompson feels that 'econologicians' "vastly underestimate the complexity of the units with which they deal."¹² (b) He also feels that they do not consider adequately how people will react to the systems they design.¹³ (c) Mosher feels that PPBS involves an oversimplified view of the world, one that is too market oriented.¹⁴ (d) Wildavsky feels that "economic rationality, however laudable in its own sphere, ought not to swallow up political rationality--but will do so if political rationality continues to lack trained and adept defenders."¹⁵ (e) Fenno notes that many budget reform proposals--more coordination, more integration, more comprehensive consideration--are rejected by Congressmen not because Congressmen are less intelligent or less concerned with the public interest than anyone else, but because they do not feel these reforms "are likely to help them perform their function any better."¹⁶ (f) Wildavsky sees program budgeting as tying the President's hands to five-year expenditure commitments while Presidents like to maintain their freedom.¹⁷

The environment of federal civilian programs is both complex and reactive. It is reactive both in the market sense and in the game-theory sense. Thompson's criticisms--(a) and (b)--represent serious obstacles to OR/MS in any institution. They can be and are being overcome through

the accumulation of experience and through the inclusion of a mix of professional skills in analytical units. Yet the units with which politicians or sociologists deal are also more complex than they realize; if they were not, either our policies would be better or sociologists would be kings.

OR/MS may be econological rather than sociological, but the model of economic man has proven itself to give, at least in this culture, more consistently reliable predictions than any other.¹⁸ Political sensitivity is important, but attempts to breathe some useful life into this concept have involved its explication in terms which OR/MS analysts find congenial: political resources, exchange costs, and opportunity costs.¹⁹ Wildavsky's interpretation of 5-year expenditure projections as a politically unrealistic attempt to tie the President's hands is unsupported by either practice or theory; proof of political insensitivity need to rest on more than that misrepresentation. These allegations discriminate neither among tactics appropriate for diverse political arenas (e.g., Congress, bureaucracy, community), nor between what Wildavsky distinguishes as "systems" and "policy" politics.²⁰ Fenno's comment (e) introduces the factor of purpose. His notion is stated elegantly by two prominent management scientists in an essay,²¹ the reception and wide circulation of which is evidence that the analytical community has not neglected Fenno's point.

Even if OR/MS analysts are politically insensitive, they operate in a bureaucratic environment conducive to learning that skill. They are, generally by choice, "on tap and not on top".²² This set of criticisms is generally appropriate but hardly profound, in general it applies as well to any human activity transcending epistemological and political fatalism.

Critical Variables are not Measurable

This is a related criticism and has as a corollary the claim that, consequently, the analysts will solve the problem that remains after these critical factors have been ignored. Thompson writes.²³

The neo-Taylorites set up self-serving rules that assure their being able to reach determinate solutions. That is, they solve what problems they can, not the problems that most need to be solved.

Both parts of this charge are too familiar to require further documentation. It assumes that all problems which OR/MS analysts face are, in fact, unamenable to quantification of the most salient variables and that analysts are unimaginative in their efforts at quantification. Neither of these assumptions is particularly true. Many problems in areas like housing transportation, banking, agriculture, and others involve the expression of public preferences through market mechanisms. In reading critiques of this type, one might assume that the government was involved only in mental health, education, and efforts to increase human feelings of self-worth. Further, many analysts are skillful users of behavioral measures.

In "soft" policy areas, primary goals may be measurable and the "unmeasurable" goals only secondary at best. An illustrative cause celebre is the Westinghouse Learning Corporation study of Head Start. Reflecting on controversy, Williams and Evans state that it is necessary to limit the scope of analytical studies.

Despite its many other objectives, in the final analysis Head Start should be evaluated mainly on the extent to which it has affected the life chances of the children.²⁴

The key indicators of this were measures of enduring cognitive and motivational change. When enduring changes were found in a small fraction of the previous studies which used these same measures, the critics of the Westinghouse study remained quiet. Williams and Evans conclude:²⁵

The milieu for meaningful program evaluation involves an interaction of methodology, bureaucracy, and politics; it will therefore often be the case that attacks against evaluations will be made which are methodological in form but ideological in concern,

There is a large amount of progress in the social sciences in the measurement of variables long felt to be immeasurable. The problem is rarely that variables cannot be quantified nor even that analysts will not try when they can be; sometimes rather it is that politicians will not allow the use of the behavioral sciences measuring instruments that are available²⁶

Wildavsky has commented in several places on the problem of making interpersonal comparisons of utility. He notes that "public works projects have a multitude of objectives and consequences" and that "no single welfare function can encompass these diverse objectives."²⁷

"No one knows how to deal with interpersonal comparisons of utility." ²⁸
"The process we have developed for dealing with interpersonal comparisons in government is not economic but political."²⁹

Anti-Pluralists like McConnell and Wolff show that in American politics explicit interpersonal comparisons of utility are avoided through a variety of institutional and ideological mechanisms.³⁰ Yet giving the marginal dollar to the SST rather than to OEO makes the comparison anyway, in effect. Perhaps the critics fear making comparisons explicit. If so, then they ought to reject all valid knowledge from policy making. OR/MS can contribute usefully to an understanding of means-ends relations and of relations among ends. It cannot produce algorithmic solutions to complex value choices: although it changes the argument, it does not replace politics. For the latter, OR/MS should not be faulted.

Costs of Calculation

Bertram Gross, among others, has alerted us to the danger of "paralysis by analysis".³¹ Wildavsky has argued that "policy analysis is expensive in terms of time, talent, and money",³² and he criticizes the "paper pushing"

aspects of PPBS--program structures, PM's and PFP's. He writes approvingly in his study of zero-base budgeting of such calculation aids as "what Congress would approve, what the statutes required, what could be done with available resources."³³ In The Politics of the Budgetary Process he even offers the example of the voter's use of party preference as the type of calculation short-cut to be admired.³⁴ Yet problems can be over-studied, and politicians have developed devices for intentional paralysis.³⁵ Wildavsky's criticisms of "paper pushing" were anticipated by Budget Bureau action.³⁶ The simplicity of calculation in present policy making and budgeting procedures may be overrated. Clearly there is a lot of calculation going on, as one year's collection of budget hearings, Congressional Records, and agency studies would testify. One must assume that Congressmen and agency officials actively seek information and might well like better information than they have. Through screening and filtering processes, these officials might well find a way to drop the least valuable item of information from their attention list and replace it with something better. At the same time, some of the calculation aids listed by Wildavsky become less useful upon inspection. Statutes are often not very clear and judges spend years determining what the law is.³⁷ "What can be done with available personnel and resources" is also not so easy to discover, and this is one reason why operations researchers command GS-14 and -15 slots in Washington. Whether OR/MS in any of its forms adds an unbearable burden of calculation is contingent upon whether it replaces or supplements other calculations. It may be that it at first supplements and then replaces other calculations. Redundance would seem an advisable interim tactic, and the general criticism is probably a function of the temporary novelty of new ways of making decisions rather than a permanent fixture.

Each of the preceding criticisms suggests that OR/MS in civilian government is either impossible or not worth the effort. Some of them are trivial and undeserving of sustained discussion as posed. Other arguments are dependent for their relevance on the fast-disappearing novelty of OR/MS or upon an inadequate appreciation of OR/MS in a social context. Some of the criticisms are fast losing their relevance because of the actions taken by analysts before the criticisms became widespread outside of professional analytical circles. But each deserves consideration for its social function. Even those who argue that OR/MS is impossible may, as they provide needed elaboration of their critiques, stimulate better performance on the part of analysts and more realistic expectations about OR/MS on the part of political decision makers.

THE PESSIMISTIC CRITIQUE, PART II: NO IMPROVEMENT

It is not enough to say that OR/MS is difficult or impossible. Were we not accustomed to it, the way that decisions are currently made might also seem impossible. The second half of the pessimistic critique states that, even though OR/MS is possible, it will not be an improvement upon present methods. Present methods for making decisions are far more rational than they appear, the argument continues. Whereas Wildavsky is the best known proponent of the first part of the pessimistic critique, Charles E. Lindblom is identified intimately with the second. His writings have opened new areas of inquiry in more than one discipline³⁸ and have won deserved acclaim. Five themes run through his work from his early articles to the present, and for the sake of brevity most references will be to well-known and widely circulated articles.

Failure of Comprehensiveness

The first theme is the inadequacy of central coordination and comprehensive inquiry. Each concept, according to Lindblom, suffers from a failure to account for man's limited capacities for calculation and in-

formation processing and from the frequent impossibility of casting a problem into a means-ends framework.³⁹ Lindblom offers a caricature of synoptic rationality that approximates the recommendations offered by some budgetary reformers and writers of textbooks in administrative practice.⁴⁰ The outlines are familiar. He ascribes it to OR/MS advocates and thus it becomes of interest here. In making this ascription Lindblom has, I feel, made a fundamental error. To see why, it is necessary to distinguish three uses of the comprehensive model: (1) as an ideal for the socio-political solution of problems; (2) as an ideal in individual inquiry; (3) as a model for reconstructed logic. Used as either (1) or (2) the model may be impossible. But that does not mean it is worthless. Rather, the comprehensive model is best seen as a checklist: the analyst evaluates his own work or social and political decision processes to see if they can be reconstructed in the comprehensive model. Making the reconstruction is a way of checking to see what has been left out, and therefore the reconstruction provides a basis for an incremental process of planning and inquiry. In other words, the comprehensive model is a discipline, as is suggested by Roger Jones's comments on Lindblom and by the research project histories collected by Hammond.⁴¹ The failure to see the comprehensive model as the discipline of reconstructed logic can lead one to view OR/MS as inferior, particularly for large scale problems.⁴²

Superiority of Incrementalism

Incrementalism refers both to a strategy for policy development and to a strategy for social change. Lindblom writes:⁴³

The incremental method is characterized by its practitioner's preoccupation with: (1) only that limited set of policy alternatives that are politically relevant, these typically being policies only incrementally different from existing policies; (2) analysis of only those aspects of policies with respect to which the alternatives differ; (3) a view of the policy choice as one in a succession

of choices; (4) the marginal values of various social objectives and constraints; (5) an intermixture of evaluation and empirical analysis of the consequences of policies for objectives independently determined; and (6) only a small number out of all the important relevant values.

Supposedly, policy making proceeding in this fashion will be more rational than that which emerges from a more comprehensive analysis. The incremental model has been applied most frequently to budgeting.⁴⁴ Yet Congressional budgeting can be modeled adequately by a few linear equations, a fact which lead Otto Davis to testify that:⁴⁵

...one can abolish the appropriations committees. They are not needed because their behavior is even more predictable than the executive branch's behavior.

Such a predictable system may not be all bad; its rationality is somewhat elusive however.

Justifications of the superiority of either incremental or "comprehensive" processes usually have the same defect: they ignore output and concentrate on secondary criteria.⁴⁶ No process can justify the egregious policies which have happened to us incrementally, such as our farm programs, urban renewal, and the "Viet-Nam" war. Incrementalism seems particularly inappropriate in situations where some objectives are far more important than others; for over time other, less relevant, objectives may become equally well served. Subsidy programs also can be distorted more easily and less noticeably through incremental than through "comprehensive" processes. Lastly, in incremental processes undesirable side effects may become institutionalized. The value of the comprehensive approach as reconstructed logic can be seen here. It builds in an evaluation of consequences of both kinds: are we reaching our goals, and are we having unintended consequences?

At its best, incrementalism is more than a strategy for policy making that ignores consequences and outputs. It can also be an experimental epistemology in the sense discussed by Karl Popper in his interesting

essay, "On the Sources of Knowledge and of Ignorance".⁴⁷ Well-known management scientists interpret OR/MS in much the same way.⁴⁸ We approximate knowledge through continual "conjectures and refutations". We continually examine purpose and proposals logically and empirically because we are faced with multiple goals and changing environments for all our interesting problems. If incrementalism at its best is superior to OR/MS, it is because its involvement of a wider number of actors in the conjecture and refutation process leads to better output.

Incrementalism and Participation

If we must evaluate policy on the basis of output, we can still look at participation under the hypothesis that scope of participation is positively related to quality of output. Pluralist doctrine assures us that all relevant interests will be represented. Wildavsky discusses how altruistic citizens, entrepreneurial politicians, and imperialistic bureaucrats will make sure of that.⁴⁹ Yet we know that there are strictly technical barriers to interest mobilization and organization, and I hope that we know that politicians and bureaucrats have effective ways of suppressing or ignoring some interests.⁵⁰ Some political arenas are effectively closed to large segments of the public; for example, most of administrative law. Analysis is one method which can be used to include in the policy making process interests and potential or real consequences which would otherwise be neglected. In this way analysis may be superior to incrementalism even when incrementalism is working at its best. The analyst is not only a "partisan efficiency advocate",⁵¹ but may also be an advocate of otherwise unrepresented interests.

Goals, Means, and Agreement

Yes, the devotee of Lindblom's writings will answer, but what about the problem of getting agreement. There is, supposedly, some value in not making one's goals explicit in the political process: unstated values and

ideologies do not prevent agreement on marginal values or on means: considered in actual choice situations, alternatives may weigh in differently than they do in the abstract.⁵² As an ethical statement that is far more appropriate to the marketing of vegetables than it is for the expenditure of tax money.

At the same time analysis, while requiring explicit statements of goals, does not compel their appearance on the front page of the Washington Post. They need not be known beyond the agency. The goals of the analyst can be and often are tactically concealed.

Goals often change through the consideration of means. This is true in OR/MS and in incrementalism.⁵³ This in itself is not an argument for keeping goals hidden from the outset. It may be the reverse: the conjecture and refutation process may be facilitated if goals are stated. One large class of decisions where this may be true are those over which interaction can be described as "analytical" rather than "bargaining".⁵⁴ Even if this is not the situation, we are still not in a position to assert the superiority of incrementalism. Both game theory and classical economics gain validity the more people know about them.⁵⁵

The argument that goals should not be made explicit has another aspect. Lowi has argued that part of the current national malaise results from the government's failure to state and pursue explicit goals. Contemporary laws are written as broad and rather empty statements of good intentions, and the government itself becomes only one of many interests contesting to determine what the specific goals will be.⁵⁶ (This fact implies, of course, that it is easier to get agreement on ends than on means!) It is clear that the incrementalist position on stating goals is more than a methodological recommendation or even a neutral political recommendation. Rather, it is part and parcel of the dominant American "public philosophy" of "interest group liberalism". The OR/MS position on stating goals is at

this time still an exclusively methodological one; it has not been linked to an articulated political philosophy.⁵⁷ It has political implications, however, and therefore the relative superiority of either incremental or OR/MS approaches to political decision making can be resolved on only partially technical grounds.

Coercion and Incentives

We cannot dismiss the notion of conflict yet however, Elsewhere Theodore Lowi has noted the paradox that in recent years, political scientists writing about policy making have ignored coercion while many economists writing about the same topic find coercion important.⁵⁸ Lindblom is concerned with removing coercion more conventionally because of its inefficiency. He argues for the manipulation of a price system rather than the use of production quotas or priority rationing as a means of achieving national economic goals. If price systems are recognized as separate from free markets they will be seen as important aids to rational administration.⁵⁹ In an earlier book he and Dahl write that a price system involved "spontaneous field control" which is, paradoxically, "both tyrannical and free".⁶⁰ For the decade of the 1970's the term is, rather, "incentives". Incentives are superior to central administration because they are cheaper and easier to operate, and probably more effective.⁶¹ Former Budget Director Schultze finds that the manipulation of incentives is essential for the implementation of policies involving dispersed and delegated power and program operation. Yet the incentives are difficult to design and demand a careful attention to goals.⁶² Former O.E.O. planner Robert Levine concludes that a cost of using incentives systems arises from their potential for individual abuse. While net losses may be small, they still must be controlled. Yet it is OR/MS that offers the models and techniques suitable for this task.⁶³

If a price or incentives system (an idea that derives from the incrementalist argument) is superior to an administered system (an idea more commonly associated with planners and OR/MS analysts), the former cannot be effective without large inputs from the management sciences both in design and operation.

Several more brief comments about Lindblom's ideas and their relation to OR/MS are necessary before this section can be summarized. (1) the incrementalist approach is under attack from "anti-pluralists" as leading to unjust policy outcomes.⁶⁴ That systemic morality results from the morality of the sub-systems seems a fundamental assumption of contemporary pluralist thought. This has been challenged outside of the partisan confines of the pluralist² antipluralist debate by the philosopher and management scientist C. West Churchman⁶⁵ and deserves greater attention than it has received from "incrementalists". (2) Central coordination is a concept which needs rethinking. The design and implementation of incentives systems assumes a greater degree of centralization than is normally considered desirable in incrementalist arguments. Dahl and Lindblom's early comments on the tyranny of "spontaneous field control" should be revived. (3) There have been important improvements in the methodology of systems design. Lindblom's writings have certainly been seminal. Simon's discussion of "nearly decomposable systems" implies the possibility of significant simplification in social design.⁶⁶ Finally, Forrester argues that too often we mistake coincident symptoms for cause and that incremental adjustment is based on the logic of first-order, negative-feedback systems. But all social systems are "high-order, multiple-loop, non-linear feedback structures" which require for their management the discovery of completely nonobvious relationships. Failure to appreciate this may lead designers (including politicians) to make heavy-handed and counter-effective interventions when minor but unobvious adjustments would be effective.⁶⁷ The strategy of incremental policy change may simply be intellectually inadequate unless supplemented by prior, more comprehensive analysis.

The case for incrementalism rests upon a failure to distinguish reconstructed logic from a design algorithm, and upon a dogmatic moral perspective. When both incrementalism and OR/MS are properly conceived, the two are often complementary and sometimes identical in part. Where they differ, the superiority of incrementalism, even on the criteria chosen by its advocates, is in every case questionable. Incrementalism as a strategy of policy change, rather than as a method of inquiry and debate, may depend on significant OR/MS inputs. Finally, recent developments in the methodology of systems design make possible more comprehensive analysis and coordination. These developments include the significant and articulate contributions of Lindblom and other incrementalists.

THE OPTIMISTIC CRITIQUE

The major component of the optimistic critique is the perceived effect of OR/MS on governmental institutions and, specifically, the effects of PPBS and analysis on budgetary politics. Wildavsky makes the strongest statements on this topic in his belated discovery that PPBS affects policy by affecting the way decisions are made ("system politics").⁶⁸

My contention is that the thrust of program budgeting makes it an integral part of system politics.

Having discovered this fact, Wildavsky appears convinced of the impending disaster. Yet "system politics" have been effectively practiced by commercial interests. Walton Hamilton, in arguing that industry has been the major source of 20th century constitutional innovations in America, makes it clear that he is writing about "system politics".⁶⁹ Congressional committees even play system politics with PPBS by withholding funds and positions for department-level PPBS staffs,⁷⁰ a practice consistent with "the traditional unwillingness to allow the Office of the Secretary to be properly staffed".⁷¹

Perhaps the fear is not so much of "system politics" as it is of program budgeting itself. Budgeting involves questions of who shall prevail regarding what is in the budget: ⁷²

If we substitute the words 'what the government ought to do' for the words 'ought to be in the budget' it becomes clear that a normative theory of budgeting would be a comprehensive and specific political theory detailing what the government's activities ought to be at a particular time.

Normative budget theories are "totalitarian" in Wildavsky's view. His conclusion demands from such theories a degree of precise elaboration that neither exists nor is forthcoming, and again there seems some overreaction. All normative budget theories, including Wildavsky's own defense of the budget practice that currently obtains, have the consequence of indulging some and depriving others in fairly regular patterns. One is left with the suspicion that Wildavsky's fears rest on unstated, undefended policy and constitutional preferences.

Fenno also argues that "no budgetary reform is neutral". He feels that the appropriations process is the key source of the House's power and that its members realize that budget reforms begun in the executive branch are threatening to them. Consequently, Congressmen will, and those sympathetic to them should, scrutinize PPBS for its effects on the power of the purse. ⁷³ Otto Davis, however, finds that Congress follows executive budget proposals so closely that: ⁷⁴

....If one is worried about the implication of PPB for Congressional control, and if one thinks that the additional complexities in the budgetary process caused by PPB analysis might in some way cause Congress to lose control of the budgetary process, then one is really worrying about a fictitious issue.

OR/MS, if used by Congressmen, might have an effect opposite to what Wildavsky and Fenno anticipate: It might strengthen Congressional control by directing it to important policy issues.

Several other fears are included in the optimistic critique. One is that OR/MS will lead to a major increase in political conflict. This is a reasonable deduction from some of Dahl's work⁷⁵ and has been discussed under the second part of the pessimistic critique. The counter-arguments would be essentially similar. Another is more apocalyptic. Bertram Gross counters the suggestion the PPB methods will lead to "professionalization, large-scale institutionalization, and 'depolitization' of politics through monopoly by technocratic politics of what Wildavsky calls 'total efficiency rationality'. He suggests that in the context of the development of "post-industrial service societies", present day systems analysis may be seen as one of the technological factors that tend to promote disorder and discontinuity rather than social systematization.⁷⁶ He continues: ⁷⁷

The diffusion of systems analysis of the more narrow variety could provoke continued enlargement of anti-institutional politics--particularly if systems analysis used (sic) by political leaders as window dressing for a 'welfare-warfare State'.

Such hyperbolic language is hard to take seriously. It sounds like a stump speech in the vagueness of its rhetoric. At the same time, the claims offered on behalf of systems analysis are so extensive as to be, I hope, ridiculous on even casual inspection. Is systems analysis really necessary for a "welfare-warfare State"? I think not.

In general, preoccupation of both critics and advocates of OR/MS with the budget process has been misplaced. First, much of the government's activity is funded through: (a) trust funds; (b) permanent and indefinite appropriations (interest on national debt); (c) fixed charges (expenditures determined by eligibility requirements and/or statutory formulae like Veterans' benefits); and (d) ongoing projects (what does the government do with half a bridge?).⁷⁸ Fenno notes (e) public debt transactions as

another way of circumventing the budget process.⁷⁹ Combined, these alternatives include about half of the annual federal expenditures. But this half is amenable to analysis even if it is not effectively in the budget.

Secondly, budgeting is more complex as well as less relevant for the use of OR/MS than it first appears. Schick ascribes three functions to budgets (planning, management, and control) and contends that:⁸⁰

Multipurpose budget systems are a vital part of the future of budgeting. Although many of the problems have not been solved or even recognized, budgeting in the future will not be able to neglect its planning role or abandon its investment in control and management.

The use of the budget as an instrument of rational policy choice is in practice reconciled to these other functions.

Of course, the amount of money appropriated does have an impact on what the consequences of a program will be. Particularly with a new program, the budget process is often critical. In general, Fenno observes, "the separation between appropriations and legislation is difficult to maintain."⁸¹ Yet maintained to a large degree it is, according to his mammoth study of the appropriations process.⁸² There are institutional norms and enforceable expectations concerning policy making by the appropriations committees. Critical decisions are made in authorization committees which jealously guard their policy making prerogatives. Further, much critical policy has a high degree of independence from appropriations (e.g. rules governing the sale of securities or rules for tax accounting). In discussing the impact or possibility of OR/MS the fixation upon the budget process is misplaced.

NEW DIRECTIONS IN THE ANALYSIS OF ANALYSIS

OR/MS must be seen as a complex phenomenon. It penetrates throughout the federal establishment and no single defect will significantly retard its diffusion. Because it is complex, its affects upon the government

and society cannot be captured in felicitous phrases or catchwords. We come to Charles Schultz's more realistic question of how OR/MS can fit into the political decision process. ⁸³

Schultze offers some hypotheses about which kinds of programs will be, politically, the most feasible to analyze. He concludes:⁸⁴

....analysis can operate with fewer constraints and can profit from consideration of a wider range of alternatives in programs that produce a pure public good and do not directly affect the structure of institution and political power than in programs that produce a quasi-public good, fundamentally affect income distribution, or impinge on the power structure.

He notes, a bit forlornly, that the programs for which there is the greatest relevance of market criteria as well as the best data and prior theoretical and empirical work are just those programs which involve income subsidies to powerful groups. ⁸⁵ A corollary is that analysis will be more feasible for new and rapidly expanding programs than it will be for these subsidy programs. ⁸⁶

Wildavsky suggests: ⁸⁷

Policy analysis is facilitated when: (a) goals are easily specified, (b) a large margin of error is allowable, (c) the cost of the contemplated policy makes large expenditures on analysis worthwhile.

Some exceptions may be taken; regarding costs, for example, OR/MS has been applied to such minor government activities as the helium program at the direction of the Budget Bureau. ⁸⁸ But these propositions represent a first step toward an empirical evaluation of the potential for analyzing government programs systematically.

A second new direction involves the listing of preconditions for the success of an OR/MS staff in an organization. Mosher and Harr find that the following conditions facilitated the use of PPBS in the Department of Defense: (a) the many prior years of analytical work and the many available and experienced defense analysts; (b) clarity of the DOD mission; (c) the

strength, abilities, and sympathies of the Secretary; (d) a relatively simple appropriations structure; and (e) a bias toward the procurement of hardware. In the civilian agencies, in contrast, all these conditions are reversed and, further: (a) mission boundaries differ from organization ones; (b) measures of objectives are hard to obtain; (c) programs often involve grants or loans to spenders outside the immediate control of the agency; and (d) political feedback is immediate and ubiquitous.⁸⁹ Reflecting this excellent list against the conclusions from their study of programming systems in the State Department, one finds almost complete discrepancy. Aside from legal and personal leadership weaknesses, Mosher and Harr find that intra-organizational, inter-group, and inter-personal factors were responsible for the failure of the programming innovations they studied. Chance, expressed in external events and in the location of key personalities, was also a factor.⁹⁰ In other words, they find that the real barriers to OR/MS are the same ones common to all attempted organizational change. The conclusion I draw from this is that most discussions of why the civilian agencies cannot do PPBS (Schultze's comments above are an exception) are either lists of temporary obstacles or, worse, simply irrelevant. In the former category fit most discussions of technical obstacles, and in the latter fit most discussions derived from pluralist dogma.

We can begin to see the importance of organizational factors even more surely when the recommendations for improving OR/MS in civilian government are revealed. Take, for example, some of the recommendations of Aaron Wildavsky. He advocates "policy analysis" or management science supplemented with behavioral sciences.⁹¹ For his policy analysis units, Wildavsky recommends spending only half of their time on short-range projects with the other half reserved for long-range analyses. He is sensitive to the tension between organizational demands for immediate results and the mission of

long-range analysis. He recommends that the policy analysis unit report "directly to the Secretary or the agency head" to show that it "is meant to be taken seriously". Policy analysis must have the support of agency top management, and policy analysis should be "geared to the direct requirements of top management."⁹² Each of these recommendations shares a common attribute: they could be found in just about any of hundreds of articles on how to start an operations research group which appeared in trade, engineering, and management journals around the world during the past twenty-five years.⁹³ This is like saying, however, that the recommendations are truisms with all the wisdom--but also the validity--that truisms offer. Each of these recommendations can be evaluated against the insights derived from several years of studying OR/MS staffs.⁹⁴ Following is an example of such an evaluation.

It is rare that an OR/MS staff has complete control over the fraction of its time that it allocates to long-range studies. The priority problems of management, the legitimacy accorded to the research mission by managers, the technical skills of the analysts, their familiarity with organizational problems and procedures, and the extent to which they have developed stable relations of understanding and confidence with top and operating management all affect the way they allocate their time. The impact of each of these factors varies with the location of the staff in what is actually a lengthy (as much as 10 years) process of becoming integrated into the organization. Only the best OR/MS staffs, then, are able to control their own time; "best" refers to technical skills, a record of proven results, and adroit staff leadership. Even such a staff is likely to devote a significant part of its time to matters that cannot even be considered short-term projects. There will be a continuing need to service requests for advice with a turn-around time of 48 hours or less. By doing so the staff builds and maintains

the confidence which managers have in it. Long-term projects tend to be allowed under either of two circumstances: the managers do not understand what the staff should be doing, or the staff has reached an advanced stage of development. The latter, as has been implied, requires a careful cultivation of relationships with operating managers unless the staff works only for top management. But that option is possible only if the staff needs little or no cooperation from operating managers in the collection of data or the implementation of recommendations. The fraction of time devoted to long-range analysis projects also depends on the way in which the staff has developed. An OR/MS staff may attempt to compel radical changes in organizational goals or procedures; alternatively, it may accept the rates of change imposed upon it by the managers in the organization. Sometimes it will be forced to choose the latter option because its presence will not be tolerated otherwise. The whole question of how time will be allocated among projects with different time frames is about as important as any question one could ask about an OR/MS staff. It cannot be decided by fiat, especially from outside the organization, and the specific figure of 50 percent long-term and 50 percent short-term even if taken as an approximation is unlikely to result from anything but chance.

In other words, policy analysis brings us back to where we began. A new managerial technology is emerging. It is really new only in its organizational setting, and not all that new there either. Policy analysis is management science for the civilian government, and its emergence in the academic cloisters of political science is evidence that management science--or policy analysis if you wish--is now having that parallel institutionalization in the relevant academic areas which has been characteristic of all managerial technologies. At the same time, "policy analysis" is

evidence that the future of analysis in civilian government is assured and that organization theorists and other students of public organizations can move from the ideological debate over whether OR/MS can work to the scientific study of how OR/MS analysts behave in organizations and how organizations react to their presence.

NEW WAYS OF THINKING ABOUT POLICY-MAKING

Our understanding of the role of analysis in political decision making will be improved if policy making systems are appreciated in ways different from those current in political science today.

1. The dominant frame of appreciation is one derived from pluralist theory and incremental models of decision processes. Like "Professor Easton's Political Science",⁹⁵ the pluralist-incremental frame of appreciation is devoid of either social or ethical content.⁹⁶ OR/MS advocates, however adequately, have shown themselves to be concerned with the ethics of policy substance⁹⁷ although they have been less sensitive to the social dimensions of policy implementation.⁹⁸ Lowi has pioneered in the use of policy attributes as independent variables in the study of policy making processes.⁹⁹ We need to expand upon his categories and begin to look at more specific attributes of policy, such as specificity of means, amount of delegation, complexity, and specificity of goals for their behavioral implications. The analysis of the social and ethical consequences of law seems considerably more vital both within and outside of the discipline. That the substance of policy itself has behavioral implications is the first thing that should be added to our frame of appreciation.

2. We must therefore change our image of policy making processes in another way. Unlike most organization theorists,¹⁰⁰ political scientists have long perceived that decision making is a process of developing a coalition which is large enough to enforce its will upon those who, for

whatever reason, disagree with it. The coalition agrees on a commitment to take specific actions in the future, possibly only under certain contingencies. Decisions and policies have futures! After the decision has been made, there is a process of maintaining and revising the commitment. First there is the dimension of to what individual and institutional actors are committed. Pluralist-incremental models suggest that members of the coalition will have different conceptions of the commitment and that these conceptions will change as their knowledge of its implications increases, as changes occur in the environment, and as their other social roles impinge upon coalition members. Second, there is the dimension of the composition of the coalition. In implementing the commitment, some members will drop out, but other must be added. For example, one of the problematical features of many recent laws is that for their successful implementation, the coalition must be expanded to include multitudinous state and local officials. This expansion of the coalition is difficult to execute and occasions much of the current discussion of "incentive systems" as has been noted.¹⁰¹ Attention to the half of policy making that occurs after the coalition has reached agreement is a necessary addition to the frame of appreciation of both pluralist-incremental theorists and to OR/MS analysts.

3. Policy making processes are not just divided into pre- and post-decision phases. There are a series of decisions in a policy making process, and most decisions are neglected in favor of the study of the major policy making process. This is not a plea for the use of a decision making paradigm such as that suggested by Polsby:¹⁰² initiation, incubation, formulation, etc. Rather, the stimulus here is the work of Bachrach and Baratz. We should begin looking at policy making with the question of initiation, but the next step is not incubation. It is a decision to make any decision at all. The next step,

once a decision to decide has been made, is a decision on whether or not to proceed to a resolution of the issue. Most issues which are raised are probably not resolved in a way at all favorable to the initiators. The response may be, instead, repression, a court fight, a circulation of the issue to someone else, a request for further study, a barrage of propaganda and symbolic reassurance, etc. This part of the policy making process has been studied most carefully by those scholars concerned with the poor and other politically powerless.¹⁰³ But it is equally relevant for the study of OR/MS analysts in government. They, too, can be given a "run-around", or be given symbolic reassurances. Their work can be ignored if there is a decision made that no decision will be made on their proposal. Vince Davis's¹⁰⁴ study of innovations in the Navy is a pioneer attempt to analyze the multi-phase decision process that envelops innovative proposals in organizations, and further work should be done on this important aspect of public administration.

4. It is easy to assume, on the basis of pluralist-incrementalist literature, that bargaining is the essence of policy making and that knowledge and the quest for knowledge plays little, if any, part in it. Even Lindblom, who acknowledges the importance of knowledge in policy making, quietly makes bargaining and coalition the central focus of his descriptive essay on policy making.¹⁰⁵ Policy making is, however, a search for some form of truth as well as a search for some agreement among partisan and self-interested actors.¹⁰⁶ Pluralist incremental models sell politicians short. Through the adversary process, in their own way, they search for knowledge about the social system, about human behavior, about economic laws, about the relation of science to society, and other matters. If, in Rivers and Harbors, analysis is used to make incremental adjustments on political bargains, perhaps in other areas of policy--welfare, some aspects

of transportation, housing, education, and macro-economics are possibilities-- bargaining is used to make incremental adjustments on analytical recommendations. The salience of knowledge in different policy areas is a new topic for research, and the conception of policy making processes as searches for knowledge is the fourth needed addition to our appreciation of these processes.

IMPLICATIONS OF A ROSY FUTURE

If none of the arguments against OR/MS in civilian politics are particularly valid, and the key factors determining its success are intra-organizational ones, what does this tell us about American society and its policy making processes? First, it suggests that most of us, particularly those who are not part of the emerging student "counter-culture", accept the economic model of man that underlies OR/MS. The suggestion has two parts. One is that we tend to be predominantly responsive to reinforcement schedules based on economic incentives and expect others to be likewise. The other part is that in the design of policy we tend to think exclusively in terms of economic means. The pluralist political philosophy has largely eliminated the alternatives of coercion from the active consideration of policy makers and most other Americans.¹⁰⁷ Deeply rooted democratic values make us resistant to the use of propaganda and psychological manipulation as overt policy instruments except in those policy areas where our national phobia regarding Communism is operative. That, of course, is no small exception. A third alternative, policy means based on humane social and interpersonal incentives is currently not realistically available. While politicians have long manipulated these kinds of factors in pernicious ways-- e.g. racism--a social science adequate for use in the design of policy means has been developing only since the 1930's.¹⁰⁸ (Economic science has a head start of over 150 years if it is dated from Adam Smith.) This

alternative is developing in feasibility quite rapidly. Applications of social science in business organizations are becoming more common daily.

This leads to the second implication of the apparently bright future for OR/MS, one that can be raised but not answered. If OR/MS is having the future, one can ask why? Wildavsky is certainly right when he argues that budget reforms are not neutral. To shed some light on this question, let me propose two variables. Each is admittedly empirically problematic: 1. The effect of OR/MS on the distribution of political power; 2. The effect of governmental decisions on society. For the purposes here they can each be dichotomized to yield the following table.

Figure 1

Effect of Governmental
Decision on Society

A	B
C	D

Effect of OR/MS on
Political Power

A society can be changed significantly and its power structure remain largely the same. If OR/MS fits the situation described by Box A, that means that OR/MS reinforces an existing structure of power even if it leads to other important changes. For example, OR/MS might contribute to the design of construction techniques and incentives for homebuilding that would revolutionize American residence standards. These same designs could lead to concentration of the presently fragmented homebuilding industry into

large economic units controlled by the same numerically large but fractionally small financial and managerial elite which controls most other large economic enterprises. These organizations could be just as powerful politically as the present homebuilding industry. To the extent that the existing distribution of power is based upon the continued salience of a value structure based on economic incentives, Box A is a real possibility! OR/MS might succeed because it augments an existing distribution of power.

As we are considering the use of OR/MS in federal civilian government, Box D is irrelevant. Lowi's analysis of the American political system as one in which the government is just one of many interest groups (and often not the most powerful one)¹⁰⁹ implies that Box C describes the situation. Government decisions have little effect on the distribution of power. OR/MS may succeed because it is irrelevant to political power.

OR/MS could fit Box B; the counter-arguments to the optimistic critique of OR/MS suggest this as the least probable of the alternatives. Analysis of the half of policy making that occurs after the coalition has reached agreement should also suggest that this is a low probability alternative.¹¹⁰ The optimistic critique can be inadequate and still not exhaust the issue it raises however. In the immediate future, the impact of OR/MS on society through its role in governmental decision making will likely be slight. The question remains unanswered in the longer run even if certain alternatives can be eliminated.

CONCLUSION

It is conceivable that the consequences of many laws are not the ones intended by the legislators who passed them. There is no a priori reason to assume that the majority of Congress intended farm programs to

have the redistributational effects which they have clearly had,¹¹¹ for example. It is possible that if policy makers had different kinds of knowledge readily available, that policies themselves would be different. We have at this time no adequate understanding of the impact of knowledge on policy. In fact, we know very little about the relations between attributes of the policy making process and their consequences, in terms of either policies on paper or policies in action. Until we know something about these relationships, we will know very little about American politics. Pluralist-incremental doctrine, because it directs us away from questions of substance, suppresses this whole line of inquiry. Incremental models of policy making taken instead as description facilitate this line of inquiry by delineating attributes of policy making processes. The study of the impact of OR/MS on political decision making, properly conceived and executed, is as likely a place as any to start the study of the impact of knowledge on policy and, through this, of the relation between process and substance in American politics.

FOOTNOTES

1. Roland N. McKean, Efficiency in Government Through Systems Analysis, with Emphasis on Water Resources Development, ORSA Publications in Operations Research No. 3 (New York: John Wiley, 1958), pp. 6-7.
2. See the suggestive paper by Terry Clark, "Institutionalization of Innovations in Higher Education: Four Models", Administrative Science Quarterly 13:1 (June, 1968) pp. 1-25
3. James R. Schlesinger, "Uses and Abuses of Analysis", memorandum prepared at the request of the Subcommittee on National Security and International Operations, Committee on Government Operations, U.S. Senate. Washington, D.C.: U.S. Government Printing Office, 1968. p. 5.
4. Frederick C. Mosher, "Limitations and Problems of PPBS in the States", Public Administration Review 29:2 (March, 1969), p. 160.
5. Bureaucracy and Innovation (University: University of Alabama Press, 1969), p. 57.
6. Aaron Wildavsky, "Rescuing Policy Analysis from PPBS", Public Administration Review, 29:2 (March, 1969) pp. 193-194. Hereafter cited as RPA.
7. This will be discussed infra with appropriate citations.
8. In the sense that zero is a trivial solution for the equation, $X^3-4X=0$.
9. Aaron Wildavsky, "The Political Economy of Efficiency", (Public Administration Review 26:4 (Dec., 1966) pp. 292-310) reprinted in James W. Davis, ed., Politics, Programs, and Budgets (Englewood Cliffs: Prentice Hall, 1969) p. 235. Hereafter cited as PEE.
10. "Aesthetic Power or the Triumph of the Sensitive Minority over the Vulgar Mass: A Political Analysis of the New Economics", Daedalus 96:4 (Fall, 1967) p. 1118.

11. Schlesinger, op. cit., p. 3.
12. Thompson, op. cit., p. 54.
13. ibid., pp. 53, ff.
14. Mosher, op. cit., pp. 161 - 162.
15. PEE, p. 252.
16. Richard Fenno, "Comment," in Robert L. Chartrand, et. al., eds., Information Support, Program Budgeting, and the Congress (New York: Spartan Books, 1968), p. 214.
17. PEE, p. 247.
18. I shall not elaborate now on the social and political implications of that statement here except to note that there are societies where the statement would have far less validity. This tells us something about the possible effectiveness of OR/MS solutions as well as something about American culture.
19. Specifically, Wildavsky, PEE; Robert A. Dahl, Who Governs? (New Haven: Yale University Press, 1961), Books IV and V; Edward M. Epstein, The Corporation in American Politics (Englewood Cliffs: Prentice-Hall, 1969).
20. PEE, p. 246.
21. C. W. Churchman and A. H. Schainblatt, "The Researcher and the Manager: A Dialectic of Implementation," Management Science 11:4 (February, 1965), pp. B-69 to B-88.
22. In my interviews I have twice come across instances where OR/MS groups were having forced upon them what Leonard Sayles calls a "stabilization relationship," in which the group is given the power of advance approval or disapproval of some actions in the workflow (Managerial Behavior (New York: McGraw-Hill, 1964), Ch. 6). In both cases the group viewed this as an imposition upon them, potentially damaging to both their research mission and their relations with operating management.

23. Thompson, op. cit., p. 56.
24. Walter Williams and John W. Evans, "The Politics of Evaluation: The Case of Head Start" (July 14, 1969, mimeo), p. 24. Both authors were connected with the study at O. E. O., but they maintain that the views expressed in the paper are not necessarily official.
25. ibid., p. 24.
26. MacAlister Brown, "The Demise of State Department Public Opinion Polls: A Study of Legislative Oversight," Midwest Journal of Political Science 5:1 (March, 1961), pp. 1 - 17.
27. PEE, p. 234.
28. ibid., p. 233.
29. The Politics of the Budgetary Process (Boston: Little-Brown, 1964), p. 130.
30. Grant McConnell, Private Power and American Democracy (New York: Knopf, 1965); Robert Paul Wolff, "Tolerance," in The Poverty of Liberalism (Boston: Beacon Press, 1968).
31. "The New Systems Budgeting," Public Administration Review 29:2 (March, 1969), p. 128.
32. RPA, p. 191.
33. Aaron Wildavsky and Arthur Hammann, "Comprehensive Versus Incremental Budgeting in the Department of Agriculture," Administrative Science Quarterly 10:3 (December, 1965), pp. 321 - 346; reprinted in Fremont J. Lyden and Ernest G. Miller, eds., Planning Programming Budgeting: A Systems Approach to Management, first edition (Chicago: Markham, 1967), p. 145. This article and its conclusions should be considered in the context of the Department's thirty-year experience with program budgets and in the context of political events surrounding the Department during the period discussed. The authors consider neither but on the former see "Planning, Programming, and Budgeting in U. S. D. A.," a paper based on a presentation by

- William A. Carlson during a Civil Service Commission seminar in PPB, Alexandria, Va., Dec. 1 - 12, 1969 Washington, D. C.: U. S. D. A., n. d.).
34. The Politics of the Budgetary Process, op. cit., p. 147.
 35. Elizabeth B. Drew, "On Giving Oneself a Hotfoot: Government by Commission," The Atlantic 221:5 (May, 1968), pp. 45 - 49.
 36. Charles L. Schultze, The Politics and Economics of Public Spending (Washington, D. C.: The Brookings Institution, 1968), pp. 79, ff.
 37. Theodore Lowi, "Liberal Jurisprudence," in The End of Liberalism (New York: W. W. Norton, 1969); Victor Rosenblum, Law as a Political Instrument (New York: Random House, 1955).
 38. Consider his The Intelligence of Democracy (New York: The Free Press, 1965) as a theoretical essay in organization and management.
 39. Charles E. Lindblom, "Decision-Making in Taxation and Expenditures," in National Bureau of Economic Research, Public Finances : Needs, Sources, and Utilization (Princeton: Princeton University Press, 1961), excerpted in Alan A. Altshuler, ed., The Politics of the Federal Bureaucracy (New York: Dodd-Mead, 1968), p. 170.
 40. ibid., p. 165 - 166; Lindblom, "The Science of 'Muddling Through,'" Public Administration Review 19 (Spring, 1959), pp. 79 - 88; reprinted in Robert T. Golembiewski, et. al., eds., Public Administration: Readings in Institutions, Processes, Behavior (Chicago: Rand McNally, 1966), p. 295.
 41. Roger Jones, "The Model as Decision Maker's Dilemma," Public Administration Review 24:3 (Sept., 1964), pp. 158 - 160; Phillip E. Hammond, ed., Sociologists at Work (Garden City: Doubleday Anchor, 1967).
 42. Note his approving use of the quotation from Hitch in "The Science of 'Muddling Through,'" op. cit., p. 294.
 43. "Decision-Making in Taxation and Expenditures," op. cit., p. 172.

44. This literature is ably reviewed by David Caputo in "Normative and Empirical Implications of Budgetary Processes," prepared for delivery at the 1970 annual meeting of the American Political Science Association, Los Angeles, September, 1970.
45. "Testimony," in The Planning-Programming-Budgeting System: Progress and Potentials, Hearings before the Subcommittee on Economy in Government of the Joint Economic Committee, Congress of the United States, 90th Congress, 1st Session (Washington, D. C.: U. S. Government Printing Office, 1967), hereafter cited as Progress and Potentials, op. cit. See also the attachments to Davis's testimony in Appendix III, pp. 252 - 341. The quote is from p. 209.
46. See Yehezkel Dror, Public Policymaking Reexamined (San Francisco: Chandler, 1968), Chs. 1 - 6.
47. In Conjectures and Refutations: The Growth of Scientific Knowledge (New York: Harper Torchbooks, 1963), pp. 3 - 30.
48. Stafford Beer, "The Aborting Corporate Plan: A Cybernetic Account of the Interface Between Planning and Action," in Erich Jantsch, ed., Perspectives of Planning (Paris: OECD, 1969), pp. 397 - 422; C. West Churchman, "Setting the Objectives of Organizations," Internal working paper #110, 12 pp, and "Suggestive, Predictive, Decisive, and Systemic Measurement," Internal working paper #95, 12 pp., both Space Sciences Laboratory, Social Sciences Project, University of California, Berkeley.
49. The Politics of the Budgetary Process op. cit., pp. 156 - 160; Lindblom is less dogmatic on this point, "The Science of 'Muddling Through,'" op. cit., p. 300.
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51. Charles L. Schultze, op. cit., p. 96.

52. "Decision-Making in Taxation and Expenditures," op. cit., p. 174.
53. E. S. Quade at pp. 13, 36, and 423 in Quade and W. I. Boucher, eds., Systems Analysis and Policy Planning: Applications in Defense (New York: American Elsevier, 1968); and Quade, "The Selection and Use of Strategic Air Bases: A Case History," in Quade, ed., Analysis for Military Decisions (Chicago: Rand McNally, 1966), pp. 24 - 63.
54. Using the terms as in James G. March and Herbert A. Simon, with the collaboration of Harold Guetzkow, Organizations (New York: Wiley, 1958), p. 130.
55. Ithiel de Sola Pool, "Political Information Systems," in Jantsch, ed., op. cit., pp. 307 - 325.
56. Lowi, op. cit., passim.
57. In spite of Robert Boguslaw, The New Utopians (Englewood Cliffs: Prentice-Hall, 1965).
58. Theodore Lowi, "Decision Making vs. Policy Making: Toward an Antidote for Technocracy," Public Administration Review 30:3 (May, 1970), p. 315.
59. Charles E. Lindblom, "Economics and the Administration of National Planning," Public Administration Review 25:4 (Dec., 1965), pp. 274 - 283.
60. Robert A. Dahl and Charles E. Lindblom, Politics, Economics, and Welfare (New York: Harper Torchbooks, 1963, originally 1953), p. 100.
61. Lindblom, op. cit., and also his The Intelligence of Democracy, op. cit.
62. Schultze, op. cit., Ch. 6.
63. Robert A. Levine, "Redesigning Social Systems - A Note on Bureaucracy, Creative Federalism, Business, and the War on Poverty in the United States," in Jantsch, ed., op. cit., pp. 449 - 467. See also Charles L. Schultze, "The Role of Incentives, Penalties, and Rewards in Attaining Effective Policy," in R. Havemann, ed., Analysis and Evaluation of Public Expenditures: The PPB System, A Compendium of papers submitted to the Subcommittee on Economy in Government, Joint Economic Committee, Congress of the United States, 91st Congress, 1st Session (Washington, D. C.: U. S. Government

Printing Office, 1969), Vol. I, pp. 201 - 225. The Compendium is hereafter cited as Analysis and Evaluation, op. cit.

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65. C. West Churchman, Challenge to Reason (New York: McGraw-Hill, 1968).
66. Herbert A. Simon, The Sciences of the Artificial (Cambridge: MIT Press, 1969).
67. Jay W. Forrester, "Planning Under the Dynamic Influences of Complex Social Systems," in Jantsch, ed., op. cit., pp. 237 - 254.
68. PEE., p. 246.
69. Walton Hamilton, The Politics of Industry New York: Vintage, 1967, originally 1957).
70. As was the case in the State Department as related by F. C. Mosher and John Harr, Program Budgeting Visits Foreign Affairs (Syracuse: Inter-University Case Program, Inc., 1969), p. IV-9.
71. William Capron, "Comment," in Chartrand, et. al., eds., op. cit., p. 193.
72. The Politics of the Budgetary Process, op. cit., p. 129.
73. Richard Fenno, "The Impact of PPBS on the Congressional Appropriations Process," in Chartrand, et. al., eds., op. cit., pp. 175 - 176.
74. Testimony, in Progress and Potentials, op. cit., pp. 207 - 208.
75. E. g., Pluralist Democracy in the United States (Chicago: Rand McNally, 1967).
76. Bertram Gross, "The New Systems Budgeting," op. cit., p. 127.
77. ibid., p. 128.
78. Murray Weidenbaum, The Modern Public Sector (New York: Basic Books, 1969), pp. 172 - 179.

79. Richard Fenno, The Power of the Purse (Boston: Little Brown, 1966), p. 46 ff.
80. Allen Schick, "Some Problems with Multi-Purpose Budget Systems,"
Washington, D. C.: Bureau of the Budget, Program Evaluation Staff,
December, 1966, p. 22.
81. Fenno, op. cit., p. 22.
82. idem.
83. Schultze, The Politics and Economics of Public Spending, op. cit., p. 1.
84. ibid., pp. 85 - 86.
85. ibid., pp. 88 - 89.
86. idem.
87. RPA, p. 191.
88. See the list given by Jack Carlson in "The Status and Next Steps for
Planning, Programming, and Budgeting," in Analysis and Evaluation, op.
cit., Vol. II, p. 628, and also Attachment 12 in the same volume, pp.
763 - 785. A more recent list of analytical studies is submitted by
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Committee, Congress of the United States, 91st Congress, 1st Session
(Washington, D. C.: U. S. Government Printing Office, 1969), Vol. III,
pp. 695 - 697.
89. Mosher and Harr, op. cit., pp. I-10 to I-13.
90. ibid., Chapter VII.
91. RPA, pp. 196 - 200; cf. Michael Radnor, "Management Sciences and Policy
Sciences," in Policy Sciences, forthcoming 1970.
92. RPA, p. 196.
93. See Radnor and David Mylan, "Preliminary Annotated Bibliography on the
Management of Operations Research and Management Science," Cooperative
International Program on the Management of Operations Research and the

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97. For example, Paul Feldman, "Prescriptions for an Effective Government: Ethics, Politics, and PPBS," in Analysis and Evaluation, op. cit., Vol. III, pp. 865 - 885
98. Mosher, "The Limitations and Problems of PPBS in the States," op. cit., pp. 163 - 164.
99. Theodore Lowi, "Decision Making vs. Policy Making: Toward an Antidote for Technocracy," op. cit.
100. Richard Cyert and James G. March, A Behavioral Theory of the Firm (Englewood Cliffs: Prentice-Hall, 1963) is an exception.
101. Supra, pg. 15.
102. Nelson Polsby, "Policy Analysis and Congress," in Analysis and Evaluation, op. cit., Vol. III, pp. 943 - 952.
103. Parenti, op. cit., and references therein.
104. Vincent Davis, "The Politics of Innovation: Patterns in Navy Cases," Monograph Series in World Affairs 4:3 (1966 - 1967). (Denver: The University of Denver Social Science Foundation and Graduate School of International Studies).

105. Charles E. Lindblom, The Policy Making Process (Englewood Cliffs: Prentice-Hall, 1968).
106. This perspective is evident in James L. Sundquist, Politics and Policy (Washington, D. C.: The Brookings Institution, 1968).
107. Lowi, The End of Liberalism, op. cit., Chs. 2 - 3. Note that even politically deviant students are punished by having scholarships withdrawn.
108. See Dorwin Cartwright's introduction to Kurt Lewin, Field Theory in Social Science (New York: Harper, 1951).
109. Lowi, op. cit.
110. As does Grant McConnell, op. cit.
111. Analyzed in James T. Bonnen, "The Distribution of Benefits from Cotton Price Supports," in Samuel B. Chase, ed., Problems in Public Expenditure Analysis (Washington, D. C.: The Brookings Institution, 1968), pp. 223 - 254.